# A critical appraisal of "Lack of Benefit of Physical Therapy on Function Following Supracondylar Humeral Fracture"

**By**

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**Abstract**

A critical appraisal has been conducted on the research study “Lack of Benefit of Physical Therapy on Function Following Supracondylar Humeral Fracture” in response to the clinical research question “Would physical therapy interventions improve the strength recovery and prevent future limitations of pediatric patients after bone fracture?” The study appraised evaluates return of function based in motion, not strength, and so answers only part of the clinical question. Limited research was found relating strength recovery after pediatric fracture, and no longitudinal studies analyzing reoccurrence in adulthood. This study concludes that physical therapy is not beneficial, but many weaknesses were found in the research, leaving room for future studies to prove the benefit and importance of physical therapy for these types of fractures in pediatric population.

**Key words**

pediatric, fracture, therapy intervention

## Introduction

I picked this topic because, while I have worked in pediatric rehab for about 2 years I have never witnessed a child referred to physical therapy (PT) after a fracture. However, many adults still refer to their childhood injuries as a present source of pain, limitation, or an abnormal growth development. Thinking that perhaps some of these complaints could be prevented, I searched for studies about interventions in the pediatric population after a fracture to investigate the impact of immobilization on quickly growing bodies, e.g. muscle strength, endurance, range of motion, healthy joint loading. Hoping to find specific ways in which PT could benefit this population– perhaps children respond better to modalities due to their more active cells– I sought to answer *"Would physical therapy interventions improve the strength recovery and prevent future limitations of pediatric patients after bone fracture?"*

## Methods

Using the PubMed, US National Library of Medicine I searched for articles using keywords "physical therapy, intervention, fracture, pediatric," and placed limits to only include clinical trials or RTC. This limit was to ensure I reviewed only experimental or quasi-experimental designs which manipulated and measured specific– and hopefully repeatable– outcomes. These types of first-hand research have less bias than secondary reports. Because my interest was solely in pediatric involvement, I excluded "geriatric" results. I also had to exclude "osteogenesis imperfecta" as it predominated the results being a disorder requiring physiotherapy, and therefore was not relevant to my question regarding the allegedly underserved *general* pediatric population. These criteria produced 22 hits.

From there I chose this study for its inclusion of closed-reduction treatment, plus long-term subject follow up. The authors Gregory Schmale, MD of orthopedic medicine; Suzan Mazor, MD in toxicology; Laina Mercer, MS in Biostatistics; and director of orthopedic research studies, Viviana Bompadre, PhD in Sociology, conducted this study at their institution, the Seattle Children's Hospital in Washington. They were published in 2014 by the Journal of Bone and Joint Surgery.

**Results**

Summary of the study

Based on the present lack of PT prescription after cast-only treatments of pediatric fractures, these researchers sought to investigate whether PT intervention would improve function and mobility in children after receiving closed reduction treatment for a fracture at a very common site for this population: the supracondyle of the humerus. Methods included selecting a small range of patients age 5–12 years, excluding complex injuries of the humerus and situations that could hinder therapy such as language barriers, additional injuries, or developmental delays. This was a blindly-assigned block-randomized controlled trial of two groups. Researchers used a standard protocol and several validated measures of function: three questionnaires, and one tangible measure of mobility (2 degrees of freedom) conducted by a physiotherapist. These measures were taken multiple times, from baseline to 24 weeks out. Study results aligned with previous articles and books stating that children did *not* clearly benefit from intense PT treatment for simple fractures, and could regain full function left unattended after the bone healed.

Appraisal of the study introduction

This article logically leads readers into the study focus, acknowledging the current application of PT, research gaps for population generalization, prevalence of a specific injury for their subject population, and its common treatments. As important in treatment of any patient, these researchers tend toward a whole-patient approach, anticipating the effect of anxiety on physical recovery.

However, there are no references for any of the specific details listed about this fracture type. Researchers also fail to provide supporting literature on the relevance or impact of anxiety in children or rehab in general. They do not give any indication of why PT is indicated for adults but not children, other than one over-generalizing book written in 1955.

Appraisal of the study methods

Researchers properly blinded administrators where possible, followed RCT experimental design, correlated the study with their keystone literature in a longitudinal structure, and collected data for two years. Upholding exclusion criteria, researchers eliminated some of their already restricted population to isolate specific results and avoid confounding variables. They explained the features of the “standard” PT intervention used, and accounted for individual variation by measuring function bilaterally.

Negligence is evident in the absence of a licensed physical therapist in any part of this research. Treatment sessions were not effectively designed, allowing only 30 minutes for four different

tasks (heat, splinting, strength exercises, and functional activities), especially considering the distractibility of this age range. Recovery goals were set below prior level of function, and elbow motion was not measured for the full length of the study while other outcome measures were evaluated for 4 months. Due to the very high attrition rate of 50%, authors used intent-to-treat analysis to preserve baseline equality of these small groups, which is known to reduce the effect size of an intervention.

Appraisal of the study results

The authors reported on every outcome measure described in the methods, recognized the possibility of causality between several variables and attrition, and performed many cross-analysis to expose any relationships. While some trends were found, there were no significant results in these sub-analysis.

The flow diagram of the study is inconsistent with the methods discussion regarding when outcome measures were taken. It also does not clearly illustrate subject attrition or analysis inclusion.

Appraisal of the study discussion

The authors tied up their study by identifying the impact of immobilization at this region, and noted that this study's notably shorter casting time may have prevented severe deficits and the need for PT. Comparing their methods and results with previously mentioned and additional studies, authors accurately interpreted their statistics, clearly stated their results, and did not

over-generalize to different body regions or other populations. They identified such limitations as therapist intensity, subject's ability to travel, and the use of subjective outcome measures rather than true measures of performance, and possible interactions that anxiety played a part in.

Authors did not discuss any improvements that could be made to their study aside from using more objective measures, nor how the subjective measures may have been compromised by parental administration or lack of child's understanding or consistency. While they recognized the tight-grouping of scores on the ASK-p for both groups through all time points, they do not declare it an inappropriate test. While PT intervention was not a significant benefit for the studied population, researchers made no future hypothesis or research suggestions for areas where PT might be more beneficial. Researchers graded their study Evidence Level I, but their study was not well designed nor executed, and there was not extensive literature review on the variables they tested.

**Discussion**

This study reveals an opportunity for physical therapists to serve an overlooked population at the very onset of the life-long impact of injury, especially as PT is becoming more accessible and well-known. In addition, some clinicians may wish to include pediatrics in their practice as the treatment of geriatric patients becomes indirectly restricted by CMS. The clinical significance of these findings, while statistically inconclusive, prove there is some room for PT to bolster ROM improvements at least in the short term. Partially satisfying my clinical question, this study explores the long-term effects of early PT intervention, in that starting light activity soon after

fracture could potentially lead to faster recovery. However, it did not examine the strength of adjacent muscles or ligaments, nor associated reoccurrence in adults.

Despite the title of this article, a clinician would be left with too many unanswered questions to rule *out* the value of PT based on this research alone. While it is clear further studies should be conducted, due to the lack of any real negative outcomes PT could still be beneficial for this population, especially based on other evidence supporting intervention for similar injuries and prolonged casting–even if only for a short course of treatment. This study could be improved by using actual physical therapists to design treatments with appropriate goals and structure. Using a more sensitive test than the ASK-p may reveal more pertinent effects of the intervention. To reduce ambiguity of the results, the complex variable of anxiety could be closer examined, isolated by evaluating triggers, and analyzed as a baseline characteristic. Estimated statistics of non-compliant subjects could have been evaluated further with sensitivity analysis, and a follow-up survey may have been useful to determine a subject's most-limiting barrier of attendance.

I have little confidence in the research validity of this study based on its many design flaws, so I would not heed its suggestion to dismiss PT for this population and injury. Since no significant negative effects arose from the PT group, once licensed I would adapt their "standard" treatment with my specialized knowledge for an appropriate treatment plan based on patient activities. By taking detailed notes I can evaluate if my intervention is benefiting a patient and discontinue or change the treatment if it is not beneficial.

This critical appraisal finds the research study “Lack of Benefit of Physical Therapy on Function Following Supracondylar Humeral Fracture” to have more weaknesses than strengths. The study reflects excellent data analysis by the researchers, but poor design, use of invalid tests, and neglect of relevant variables.